Before the
Federal Communications Commission
Washington, DC 20554

In the Matter of:	)	
	)	
Unlicensed Use of the 6 GHz Band	)	ET Docket No. 18-295
	)	
Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz	)	GN Docket No. 17-183
	)	
	)	
	)	

REPLY COMMENTS OF THE NATIONAL PUBLIC SAFETY TELECOMMUNICATIONS COUNCIL

The National Public Safety Telecommunications Council (NPSTC) submits these reply comments in response to the Notice of Proposed Rulemaking (NPRM) in the above captioned proceeding.[1] The NPRM seeks comment on proposed rules to implement automatic spectrum sharing by unlicensed devices in the 6 GHz band used for critical fixed microwave links and other services. In these reply comments, NPSTC highlights overall concerns about potential interference expressed by multiple parties in the first round comments. NPSTC also addresses several technical issues raised in the comments to help protect critical fixed links should the Commission implement automatic spectrum sharing by unlicensed devices in the band.

[1] *Notice of Proposed Rulemaking,* ET Docket No. 18-295 and GN Docket No. 17-183, released October 24, 2018.

The National Public Safety Telecommunications Council

The National Public Safety Telecommunications Council is a federation of public safety organizations whose mission is to improve public safety communications and interoperability through collaborative leadership. NPSTC pursues the role of being a resource and providing advocacy for public safety organizations in the United States on matters relating to public safety telecommunications. NPSTC has promoted implementation of the Public Safety Wireless Advisory Committee (PSWAC) and the 700 MHz Public Safety National Coordination Committee (NCC) recommendations. NPSTC explores technologies and public policy involving public safety telecommunications, analyzes the ramifications of particular issues and submits comments to governmental bodies with the objective of furthering public safety telecommunications worldwide. NPSTC serves as a standing forum for the exchange of ideas and information for effective public safety telecommunications.

The following 16 organizations serve on NPSTC's Governing Board:[2]

American Association of State Highway and Transportation Officials
American Radio Relay League
Association of Fish and Wildlife Agencies
Association of Public-Safety Communications Officials-International
Forestry Conservation Communications Association
International Association of Chiefs of Police
International Association of Emergency Managers
International Association of Fire Chiefs
International Municipal Signal Association
National Association of State Chief Information Officers
National Association of State Emergency Medical Services Officials
National Association of State Foresters
National Association of State Technology Directors
National Council of Statewide Interoperability Coordinators
National Emergency Number Association
National Sheriffs' Association

Several federal agencies are liaison members of NPSTC. These include the Department of

[2] These comments represent the views of the NPSTC Governing Board member organizations.

Homeland Security (the Federal Emergency Management Agency, the Emergency Communications Division, the Office for Interoperability and Compatibility, and the SAFECOM Program); Department of Commerce (National Telecommunications and Information Administration); Department of the Interior; and the Department of Justice (National Institute of Justice, Communications Technology Program). Also, Public Safety Europe is a liaison member. NPSTC has relationships with associate members: The Canadian Interoperability Technology Interest Group (CITIG) and the Utilities Technology Council (UTC), and affiliate members: The Alliance for Telecommunications Industry Solutions (ATIS), Open Mobile Alliance (OMA), Telecommunications Industry Association (TIA), TETRA Critical Communications Association (TCCA), and Project 25 Technology Interest Group (PTIG).

NPSTC Reply Comments

Public safety, critical infrastructure industries (CII), commercial operators, broadcast auxiliary operations, cable TV relay, fixed satellite services and some industrial/manufacturing use of ultra-wideband all currently exist in the 6 GHz band. Given this already diverse and critical use of the spectrum, it is not surprising that the comments question the viability of adding millions or possibly billions of unlicensed devices into the band without causing interference to higher priority services that already rely on the spectrum. Public safety jurisdictions and organizations in addition to NPSTC, CII licensees, commercial carriers, broadcast representatives and ultra-wideband device providers all expressed significant concerns about the risk of interference.[3]

As support for opening the 6 GHz band to unlicensed spectrum sharing, the Commission cites a number of statistics regarding the growth of WiFi, data offloaded from cellular, and Internet of

[3] For example, see comments of APCO, International; AT&T Services, Inc.; the City of Austin, Texas; the City of New York; the Idaho Power Company; Joint Comments of Los Angeles, CA, City and County of Denver, CO, City of Kansas City, MO, Ozaukee County, WI, San Bernardino County, CA, the Regional Wireless Cooperative and the Government Wireless Technology and Communications Association (GWTCA); the National Association of Broadcasters; Southern Company Services, Inc.; and the Joint Comments of The Utilities Technology Council (UTC), the Edison Electric Institute (EEI), the American Public Power Association (APPA), the National Rural Electric Cooperative Association (NRECA) the American Petroleum Institute (API), and the American Water Works Association (AWWA), among others.

Things (IoT devices). For example, following are some excerpts from the NPRM[4]:

> The worldwide installed base of Wi-Fi devices is 9.5 billion, and 76 percent of North America broadband households use Wi-Fi routers as their primary connected technology. Most areas where people gather—restaurants and bars, hotels and shopping centers, and even parks and stadiums—are now covered by multiple Wi-Fi hotspots. Globally, the number of Wi-Fi hotspots is expected to grow six-fold by 2021—with more than 200 million expected in North America alone.
>
> Ericsson predicts that between 2016 and 2022 the data traffic generated by smartphones in North America will increase by a factor of six. Global mobile offload traffic comprised 60% of all mobile data traffic in 2016, significantly exceeding cellular traffic, and is expected to rise to 63% by 2021. In addition to Wi-Fi, versions of LTE, the 4G protocol used by wireless carriers, have also been developed for use on an unlicensed basis and are being used to complement existing licensed spectrum resources by relieving congestion on commercial mobile networks.
>
> One forecast predicts that there will be more than 1 billion smart home devices in the U.S. by 2023, and projects that annual spending on manufacturing IoT solutions will reach $450 billion. Because many IoT devices are expected to be low cost devices that intermittently send small amounts data, they are a natural fit for use on an unlicensed basis. According to Ericsson, there will be more than 15 billion short-range IoT devices by 2022 that will be designed to use Wi-Fi, Bluetooth, Zigbee, and other unlicensed standards.

NPSTC has two observations regarding these justifications. First, if 76% of the broadband households and most public locations where people gather already have Wi-Fi connections supported on existing unlicensed bands, sharing the 6 GHz band for more unlicensed spectrum could be unnecessary. Second, if U.S. smart homes reach 1 billion and IoT devices reach 15 billion as the Commission cites, placing this massive number of devices in the 6 GHz band certainly places the current critical services at risk of receiving interference. Despite these logical conclusions, there is clearly a political drive at the Commission to open the 6 GHz band to unlicensed operation.

Accordingly, NPSTC and other commenters provided in first round comments specific recommendations on ways to help reduce the risk of interference from unlicensed spectrum sharing.

[4] NPRM at paragraphs 5-7.

In summary, NPSTC called for a rigorous centralized automated frequency coordination (AFC) mechanism applied to both outdoor and indoor unlicensed devices, daily updates for the database of facilities to be protected, re-evaluation of channels by the AFC when an unlicensed device changes location, shutdown of unlicensed devices that lose connection to the AFC, registration of unlicensed devices with a shutoff feature to help identify and shutdown any interfering devices, device certification, and a trial testing requirement in urban, suburban and rural environments to demonstrate the AFC works properly before regular deployment of unlicensed devices is allowed. Numerous commenters including APCO, the City of Austin, TX, Comsearch, Verizon and others submitted similar recommendations.

It is notable that commenters from the public safety community reaffirm that any interference caused by unlicensed operations could affect critical links to/from 911 centers, as well as essential connections among radio system base sites and control facilities. Also, the National Association of Broadcasters provides extensive engineering analysis of the RKF study previously submitted by unlicensed proponents.[5] NAB concluded the RKF study is fatally flawed and cannot be relied upon to ensure there will be no interference.

For all these reasons, NPSTC emphasizes its position that any spectrum sharing the Commission chooses to authorize MUST incorporate rigorous mechanisms to prevent interference to these critical licensed operations that rely on the 6 GHz band, and in many areas, have no alternative spectrum available. NPSTC also would like to address some specific issues raised by other commenters, as follows.

AFC is Needed for Both Indoor and Outdoor Unlicensed Devices

A group of "Public Interest Organizations" (PIOs) submitted a joint filing that recommends the Commission NOT require AFC or any registration for indoor unlicensed devices. The filing

[5] NAB comments at pages 5-8.

cites expected growth for WiFi devices and states:

> Even if incumbents can demonstrate worst case scenarios that result in some interference to some small number of incumbents, the Commission should weigh this against the enormous opportunity loss to consumers and all other businesses. As we described in the section above, the public interest in this proceeding rests in large part on the shortage of unlicensed spectrum for local networks inside virtually every home, business, school, and public building.[6]

While NPSTC does not question the potential benefit of WiFi for farms, schools, etc., we find it difficult to believe that additional unlicensed spectrum is needed, especially in rural areas. Unlicensed operation already enjoys hundreds of megahertz of spectrum in multiple bands. However, if 6 GHz sharing is authorized, we note that Nokia demonstrated in its technical comments that fixed operations can be disrupted from both indoor and outdoor unlicensed operations. Comments from the City of New York also addressed potential interference from indoor operations. NPSTC believes schools, farms, manufacturing plants, etc. would not view disruptions to public safety operations as being in the public interest if they experienced an active shooter, fire or other emergency and needed public safety to respond. Accordingly, NPSTC reaffirms its recommendation that AFC be applied both to indoor and outdoor unlicensed use. Doing so is in the public interest.

Interference to Noise (I/N) Protection Ratio

In its comments, Motorola Solutions, Inc. (MSI) recommended an I/N ratio of -12 dB to provide adequate protection to licensed operations in the 6 GHz band. Specifically, MSI states:

> …MSI believes that a carefully selected interference to noise (I/N) protection ratio is essential. The effects of aggregate interference from tens, hundreds, or thousands of unlicensed devices in an area can have a significant effect on raising the noise floor for critical incumbent 6 GHz links, as interference effects are generally additive. Since the 6 GHz NPRM is not proposing to consider the effects of aggregate interference on fixed links, which can be significant, *conservative* interference protection ratios must be utilized to protect critical links in the 6 GHz band. To be

[6] Joint comments of Open Technology Institute at New America, American Library Association, Consumer Federation of America, COSN-Consortium for School Networking, Public Knowledge, and Access Humboldt, collectively self-titled as the "Public Interest Organizations" at page 18.

> clear, MSI would strongly support the use of aggregate interference protection computations for incumbents, but in the absence of considering the effects of aggregate interference, the interference protection ratios must be conservative. We do not believe that the proposed (e.g., 10 dB) degradation to the 6 GHz link fading margin is appropriate, since it will significantly degrade link reliability levels for critical services. MSI therefore recommends that the interference protection ratio for protecting critical incumbent links be set no higher than -12 dB I/N levels. This level is the same protection that the Commission afforded non-mission critical fixed satellite service (FSS) links for *aggregate interference* levels in the recent CBRS proceeding. The protection of terrestrial fixed links, many of which serve mission critical functionality for first responders and critical infrastructure industries, deserves equal if not greater consideration.[7]

Several other commenters supported using a -6 dB I/N ratio for protection criteria for the AFC providers. Using -6 dB would protect fixed link locations to no more than 1 dB degradation in the noise floor and thereby no more than a 1 dB reduction in fade margin. However this is only the case when there is <u>one</u> unlicensed device impacting the receiver of the fixed link. The statistics in unlicensed device growth the Commission cites in the NPRM underscores the likelihood that there could be hundreds or thousands of unlicensed devices in the area of any given fixed link receiver. Given this likelihood of more aggregate interfering devices, the noise floor and interference will continue to rise and further degrade the fade margin. Accordingly, NPSTC believes MSI's

[7] Comments of Motorola Solutions, Inc. at pages 3 and 4.

reasoning for using -12 dB I/N ratio is sound. NPSTC therefore supports the -12 dB I/N ratio as the threshold for interference.

Unlicensed Device Maximum Power Level

The Commission proposed a maximum power level of 4 Watts for unlicensed devices. In its comments, Verizon recommended a level of 50 dBm, or 100 Watts. In contrast, Zebra Technologies, Inc. which provides unlicensed ultrawideband (UWB) devices that currently support a number of industrial safety and operational requirements, recommended the Commission adopt a significantly lower power level of 30 mW for new outdoor unlicensed devices, to help protect ultra-wideband systems from interference.

As described in its comments, the devices Zebra seeks to protect appear to be similar in function to devices the Commission cites in its discussion on the importance of the Internet of Things, i.e., IoT devices. While currently used primarily in the commercial, industrial and business communities, NPSTC has also recognized the benefits of IoT devices for future public safety operations. Public Safety stakeholders that participate in NPSTC have had discussions on various public safety use cases for IoT, including a law enforcement traffic stop, a house fire, a basic EMS use case, and a vehicle crash with injuries and hazmat.[8] To be clear, specific public safety IoT solutions are yet to be determined. However, NPSTC believes there is benefit in considering the potential negative impact on ultra-wideband devices. It would be unfortunate if the Commission abandoned its stance of technology neutrality and prioritized unlicensed WiFi above unlicensed UWB technology.

[8] For a more complete description of these use cases, see NPSTC comments submitted in WP Docket No. 07-100, July 6, 2018, at pages 19-21.

Furthermore, as addressed fully in the record in this proceeding, NPSTC and other stakeholders in the 6 GHz band are very concerned about the viability of deploying expansive numbers of unlicensed devices without impacting critical licensed operations. Allowing such a high power level for unlicensed devices simply invites a higher risk of interference conflicts. Also, allowing such a high power level could create an unrealistic expectation of coverage and service from unlicensed devices that cannot be sustained. Even if that power level could initially be tolerated under the AFC provisions adopted to protect licensed operations, such a level could very well need to be adjusted downward when additional licensed fixed facilities are added to the 6 GHz band. Accordingly, NPSTC does not support the 100 Watt power level for new unlicensed devices as Verizon recommended.

Licensed Mobile Operation

CTIA recommended in its comments that the Commission adopt a Further Notice of Proposed Rulemaking proposing to repurpose the upper portion of the 6 GHz band for exclusive "flexible rights" licensed service with new licenses being chosen through an auction process. Of course, doing so would entail relocating any existing users in the band segment repurposed. CTIA recommends the Commission require auction winners to relocate incumbent 6 GHz fixed microwave and electronic news gathering operations to comparable facilities at the auction winners' expense. The CTIA comments also recommend the Commission hold discussions with the National Telecommunications and Information Administration (NTIA) about the potential to add a non-Federal government allocation to a portion of the Federal 7.125-8.4 GHz band, presumably to assist with alternative spectrum that presumably could support the relocation.

NPSTC believes CTIA underestimates the process and timing that would be required for non-Federal government licensees to relocate to Federal government spectrum. Federal spectrum normally includes secure operations, so integrating non-Federal operations on a shared basis can be particularly challenging, time consuming and by no means, assured. However, if the 7.125-8.4 GHz band could be opened as CTIA assumes, why not use that spectrum, instead of the 6 GHz band, to support the licensed mobile operations CTIA seeks to accommodate? Doing so would save the disruption and cost involved in relocating existing fixed microwave and electronic news gathering facilities. Also, it would preserve the rights of those existing licensees to modify and expand their respective operations when needed, a benefit that may not be so readily available in the Federal band. In contrast, if the 7.125-8.4 GHz Federal band could in fact be opened as CTIA proposes, mobile carriers that need additional licensed spectrum could secure an area-wide license through a spectrum auction in a portion of the 7.125-8.4 GHz band that fully covers their respective current and anticipated service area

Conclusion

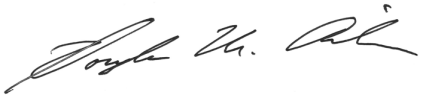
NPSTC believes the record is clear that opening the 6 GHz band to spectrum sharing increases the risk of interference to critical microwave links used to connect 911 facilities, as well as mobile communications base/cell sites. To help prevent interference, NPSTC reaffirms its previous recommendations for a centralized automated frequency coordination (AFC) mechanism applied to both outdoor and indoor unlicensed devices, daily updates for the database of facilities to be protected, re-evaluation of channels by the AFC when an unlicensed device changes location, shutdown of unlicensed devices that lose connection to the AFC, registration of unlicensed devices with a shutoff feature to help identify and shutdown any interfering devices, device certification, and a trial testing requirement in urban, suburban and rural environments to

demonstrate the AFC works properly before regular deployment of unlicensed devices is allowed.

NPSTC supports MSI's recommendation in the comments for a -12 dB interference to noise (I/N) protection ratio, especially given the unlicensed growth statistics the Commission sites that predict millions and even billions of unlicensed devices will be deployed over the coming years. With a massive deployment of unlicensed devices, the aggregate level of signal is certain to raise the noise floor. NPSTC opposes comments that recommend a high 50 dBm (100 Watt) power level for outdoor devices. NPSTC also recommends the Commission adhere to its precedent of technology neutrality and consider the negative impact of prospective outdoor unlicensed WiFi devices to current unlicensed ultrawideband (UWB) operations.

Finally, NPSTC opposes repurposing a portion of the 6 GHz band for commercial licensed operations with the required relocation of incumbent operations as CTIA proposed. To the extent a portion of the Federal 7.125-8.4 GHz band could be opened for non-government use, it would be less disruptive and less costly simply to locate the commercial mobile operations in that band, instead of relocating fixed microwave and electronic news gathering operations from 6 GHz to 7.125-8.4 GHz as CTIA proposed.

Douglas M. Aiken, Acting Chairman



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